1. (Once amended) A method for fabricating an N-type doped polycrystalline silicon, comprising:

providing a wafer;

placing the wafer in a reaction chamber;

introducing a reaction gas source, an N-type doped gas source and a gas source of a catalyst into the reaction chamber; and

performing a chemical vapor deposition process in the reaction chamber to form an N-type doped polycrystalline silicon film.

8. (Once Amended) A method for fabricating an N-type doped polycrystalline silicon, comprising:

providing a wafer;

placing the wafer in a reaction chamber;

introducing silane containing chlorine, PH_3 and B_2H_6 as a gas source into the reaction chamber, wherein an amount of B_2H_6 is lower than that of the PH_3; and

performing a chemical vapor deposition process in the reaction chamber to form an N-type doped polycrystalline silicon film at an increased deposition rate.

10. A method for fabricating an N-type doped polycrystalline silicon, comprising:

providing a wafer;

placing the wafer in a reaction chamber;

introducing silane containing chlorine and a catalyst as a gas source into the reaction chamber;

performing a chemical vapor deposition process in the reaction chamber to form a polycrystalline film, wherein a rate of depositing the polycrystalline film is increased; and

performing an N-type dopant implantation process to form an N-type doped polycrystalline silicon film.

Present Status of the Application

Claims 1-14 remain pending of which claims 1,8 and 10 have been amended to more explicitly and more clearly describe the claimed invention. It is believed that no new matter adds by way of these amendments made to the claims or specification or otherwise to the application.

The Applicants have most respectfully considered the remarks set forth in this Office Action. Regarding the anticipation rejection and obviousness rejection, it is however strongly believed that the cited references are deficient to adequately teach the claimed features as recited in the amended claims. The reasons that motivate the above position of the Applicants are discussed in detail hereafter, upon which reconsideration of the claims is most earnestly solicited.

Response to 35 U.S.C. 102 (e) rejection

Claims 1-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Hey et al. (US 2002/0020358A1, Hey hereinafter).

Claims 1-7 are rejected under 35 U.S.C. 102(e) as being anticipated by Anderson (US 2001/0001943A1, Anderson hereinafter).

Applicants respectfully assert that Hey is legally deficient for the purpose of anticipating the amended claim 1 for at least the reason that Hey fails to disclose every claimed feature of the present invention. More specifically, Hey fails to teach "*...introducing a reaction gas source, an N-type doped gas source and a gas source of a catalyst into the reaction chamber and performing a chemical vapor deposition process in the reaction chamber to form an N-type doped polycrystalline silicon film*" as taught in Claim 1. Similar argument is also applied to the rejection base on Anderson. The technical significant of the foregoing limitations is that when an N-type doped polycrystalline silicon is formed, the deposition of polysilicon is increased by introducing a catalyst into the reaction chamber. The cited references, Hey and Anderson, simply disclose the conventional method in forming either an N-doped or P-doped polysilicon, with either phosine or arsine is used in forming the N-doped polysilicon or diborane is used in forming the P-doped polysilicon. More particularly In Hey (col. 3, paragraph 32), Hey teaches forming a polycrystalline or amorphous silicon layer using a silicon source gas, and if desired, the silicon prewafer reaction layer can be doped with phosphine, diborane or arsine. Therefore, Hey is only suggesting a doped polysilicon can be formed by any conventional approach Similarly in Anderson, Anderson discloses a method for forming doped polycrystalline silicon by creating a vapor within a reactor that includes a silicon compound and one preselected dopant. The present invention, on the other hand, teaches an introduction of a small amount of catalyst, which includes diborane, simultaneously along with an N-type dopant and a reaction gas source into the reaction chamber to have an increased deposition of a doped polycrystalline silicon film. Therefore, Applicants respectfully submit that neither Hey nor Anderson renders the present invention

anticipated, as recited in claim 1. Withdrawal and reconsideration of the rejection to claim 1 and claims 2-7 dependent therefrom under 35 U.S.C. 102(e) are earnestly requested.

Response to 35 U.S.C. 103 (a) rejection

Claims 8-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over either one of Hey et al or Anderson.

With regard to claim 8, Applicants respectfully submit that claim 8 patently define over the prior art for at least the same reasons discussed above.

Hey and Anderson simply disclose the conventional silicon deposition process where a silicon source gas and one preselected dopant are used to form a doped silicon film. In Hey and Anderson, either a N-type dopant or a P-type dopant is introduced to a silicon gas source to form either a N-type doped polysilicon layer or a P-type doped polysilicon layer. The present invention, however, teaches, in addition to introducing an N-type dopant to form the N-type doped polysilicon layer, a B_2H_6 gas source is also introduced to increase the deposition rate of polysilicon. Further, since B_2H_6 is used as a catalyst, the amount of B_2H_6 is lower than that of the N-type dopant, namely PH_3. There is no where in either Hey or Anderson that discloses or suggests introducing a small amount of B_2H_6 to a gas source of PH_3 and silane containing chlorine to deposit a polysilicon film at a faster rate.

Therefore, neither Hey nor Anderson renders claim 8 and claim 9 depended therefrom unpatentable. Withdrawal of the rejection is thus respectfully requested.

Claims 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of Vinal (US 4,990,974) and Anderson.

The prior art reference Vinal teaches forming a P-doped polysilicon, followed by converting the P-doped polysilicon to an N-doped polysilicon. Vinal further teaches that the concentration for the dopant density should be high enough to permit Ohmic-metal contact to its surface. The present invention, on the other hand, teaches introducing a small amount of B_2H_6 as catalyst to the silane containing chlorine gas source to increase the rate of deposition of a polysilicon film. Since B_2H_6 is served as a catalyst, the concentration of catalyst can not and needs not be very high. Therefore, the introduction of B_2H_6 with silane containing chlorine as a gas source of the present invention is used for a totally difference purpose under a totally different process requirement. As stated in Ex parte Wisdon et al. (POBA 1873) 184 USPQ 822, "*A reference which performs a step of a process for a different purpose and does not recognize the problem solved in applicant's process does not render the process obvious*".

Anderson, as discussed in the above, discloses a method for forming doped polycrystalline silicon by creating a vapor within a reactor that includes a silicon compound and a preselected dopant. Similar to Vinal, Anderson is completely silent about forming a polysilicon film at a faster rate by introducing a small amount of catalyst to the silane containing chlorine gas source, followed by doping the polysilicon film with an N-type dopant. Therefore, there is no motivation to combine Vinal with Anderson. Even if there were motivation to combine Vinal with Anderson, Anderson will not cure the deficiencies of Vinal. Accordingly, Vinal and Anderson, neither alone nor in combination suggest or disclose the claimed invention. Withdrawal of the rejection is respectfully requested.

CONCLUSION

For at least the foregoing reasons, it is believed that all pending claims 1-14 are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned. Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version with markings to show changes made.**"

Respectfully submitted,

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

Please amend claims 1, 8 and 10 as follow:

1. (Once amended) A method for fabricating an N-type doped polycrystalline silicon, comprising:

providing a wafer;

placing the wafer in a reaction chamber;

introducing a reaction gas source, an N-type doped gas source and a gas source of a catalyst into the reaction chamber; and

performing a chemical vapor deposition process in the reaction chamber to form an N-type doped polycrystalline silicon film.

8. (Once Amended) A method for fabricating an N-type doped polycrystalline silicon, comprising:

providing a wafer;

placing the wafer in a reaction chamber;

introducing silane containing chlorine, PH_3 and B_2H_6 as a gas source into the reaction chamber [for increasing deposition rate], wherein an amount of B_2H_6 is lower than that of the PH_3; and

performing a chemical vapor deposition process in the reaction chamber to form an N-type doped polycrystalline silicon film at an increased deposition rate.

10. A method for fabricating an N-type doped polycrystalline silicon, comprising:

providing a wafer;

placing the wafer in a reaction chamber;

introducing silane containing chlorine and a catalyst as a gas source into the reaction chamber [to increase rate of deposition];

performing a chemical vapor deposition process in the reaction chamber to form a polycrystalline film, wherein a rate of depositing the polycrystalline film is increased; and

performing an N-type dopant implantation process to form an N-type doped polycrystalline silicon film.